CLAIMS

1. A method for detecting beats in a compression encoded audio bitstream, said method comprising the steps of:

    determining a baseline beat position using modified discrete cosine transform coefficients obtained from the audio bitstream;

    deriving a search window-switching pattern from the audio bitstream;

    determining a window-switching beat position using said search window-switching pattern;

    comparing said baseline beat position with said window-switching beat position; and

    validating said window-switching beat position as a detected beat if a predetermined condition is satisfied.

2. A method as in claim 1 further comprising the step of determining an inter-beat interval related to said baseline beat position.

3. A method as in claim 2 further comprising the step of storing said window-switching beat position and said inter-beat interval for subsequent retrieval.

4. A method as in claim 1 wherein said step of determining a baseline beat position comprises the step of determining at least one beat candidate and an inter-onset interval.

5. A method as in claim 4 wherein said step of determining a baseline beat position further comprises the step of checking said at least one beat candidate for reliability using a predetermined confidence threshold value.

6. A method as in claim 4 further comprising the step of converging two or more said beat candidates to a single beat candidate.

7. A method as in claim 1 wherein said step of deriving baseline beat information from the audio bitstream comprises the step of deriving an energy value for at least one subband from the compression encoded audio bitstream.

8. A method as in claim 7 wherein said subband comprises a member of the group consisting of a frequency interval from 0 to 459 Hz, a frequency interval from 460 to 918 Hz, a frequency interval from 919 to 1337 Hz, a frequency interval from 1.338 to 3.404 kHz, a frequency interval from 3.405 to 7.462 kHz, and a frequency interval from 7.463 to 22.05 kHz.

9. A method as in claim 7 wherein said step of deriving a beat position comprises the step of identifying a maximum energy value within a search window.

10. A method as in claim 7 wherein said step of deriving an energy value for at least one subband comprises the step of deriving an absolute energy value.

11. A method as in claim 7 wherein said step of deriving an energy value for at least one subband comprises the step of deriving an element-to-mean energy value.

12. A method as in claim 7 wherein said step of deriving an energy value for at least one subband comprises the step of deriving a differential energy value.

13. A beat detector suitable for placement into an audio device conforming to a compression-encoded audio transmission protocol, said beat detector comprising:

a modified discrete cosine transform coefficient extractor, for obtaining transform coefficients;

at least one band feature value analyzer for analyzing a feature value for a related band;

a confidence score calculator; and

a converging and storage unit for combining two or more said analyzed band feature values.

14. The beat detector as in claim 13 wherein said feature value comprises a member of the group consisting of an absolute energy value, an element-to-mean energy value, and a differential energy value.

15. The beat detector as in claim 14 further comprising an element-to-mean ratio threshold comparator.

16. An audio encoder suitable for use with a compression-encoded audio transmission protocol, said audio encoder comprising:

a beat detector including

a modified discrete cosine transform coefficient extractor, for obtaining transform coefficients;

at least one band feature value analyzer for analyzing a feature value for a related band;

a confidence score calculator; and

means for including beat detection information as side information in audio transmission.

17. An audio decoder suitable for use with a compression-encoded audio transmission protocol, said audio decoder comprising:

a beat detector for providing beat position information, said beat detector including

a modified discrete cosine transform coefficient extractor, for obtaining transform coefficients;

at least one band feature value analyzer for analyzing a feature value for a related band;

a confidence score calculator; and

error concealment means for concealing packet loss in audio transmission by utilizing said beat position to identify audio data for replacement of packet loss.